For those of you who just won't quit.........Yeah You! A few more challenging factor label problems.

The density of carbon tetrachloride is 1.60 grams per cubic centimeter of carbon tetrachloride. What is its density expressed in tons per cubic yard?

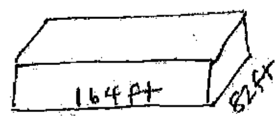
$$\frac{1.60\,g}{cm^3}\left(\frac{1\,lb}{454\,g}\right)\left(\frac{1\,ton}{2000\,lb}\right)\left(\frac{2.54\,cm}{1\,in}\right)^3\left(\frac{12\,in}{1\,ft}\right)^3\left(\frac{3\,ft}{1\,yd}\right)^3 = \boxed{1.35\ ton/yd^3}$$

The American Cancer Society a few years ago ordered 40 billion units of interferon, at a cost of \$2 million dollars, to use in studies on six types of cancer in 150 patients. A unit of interferon weighs one picogram. That year 100 MG of interferon was produced from 31,000 liters of blood. At that rate production, how many liters of blood did it take to supply the order for the A.C.S.?

If = interferon   MG = megagrams

$$4.0\times10^{10}\ units_{If}\left(\frac{1\,pg}{1\,unit_{If}}\right)\left(\frac{1\,Mg}{1\times10^{18}\,pg}\right)\left(\frac{31{,}000\,L}{100\,Mg}\right) = \boxed{1\times10^{-5}\ L}$$

To what height in meters would you be able to fill an Olympic size swimming pool (164 ft x 82 ft) with 1.24 megagrams of mercury? (Density of mercury = 5.43 g/ml)



$D = \frac{m}{V}$

$V = \frac{m}{D}$

$\frac{V}{A} = H$, $A = L \times W$

$$1.24\,Mg\left(\frac{1\times10^6\,g}{1\,Mg}\right)\left(\frac{1\,mL}{5.43\,g}\right)\left(\frac{1\,cm^3}{1\,mL}\right)\left(\frac{1\,in}{2.54\,cm}\right)^3\left(\frac{1\,ft}{12\,in}\right)^3\left(\frac{1}{164\,ft\times82\,ft}\right)\left(\frac{12\,in}{1\,ft}\right)\left(\frac{2.54\,cm}{1\,in}\right)\left(\frac{1\,m}{100\,cm}\right)$$

$$\boxed{1.8\times10^{-4}\,m}$$

A 1957 Chevy automobile averages 16.0 miles per gallon of gasoline. If a drop is a sphere of radius 2.3 mm, how many drops of gasoline are needed in order to travel 1.25 kilometers?

$\frac{1\ drop}{volume\ of\ d}$

$V_{sphere\,(drop)} = \frac{4}{3}\pi r^3$

$$1.25\,Km\left(\frac{1\,mi}{1.6\,Km}\right)\left(\frac{1\,gal}{16\,mi}\right)\left(\frac{4\,qt}{1\,gal}\right)\left(\frac{1\,L}{1.1\,qt}\right)\left(\frac{1000\,cm^3}{1\,L}\right)\left(\frac{10\,mm}{1\,cm}\right)^3\left(\frac{3\ drop}{4\pi\,(2.3\,mm)^3}\right) =$$

$$\boxed{3{,}500\ drops}$$

Of the famous Seven Wonders of the Ancient World the Great Pyramid of Khufu (Cheops) at Giza is the only one still standing. Even for modern men it is amazing how this man-made structure lasted so long. Assuming that the structure is made entirely of limestone with an average density of 2.75 tons/m^3, what is the mass of the Great Pyramid of Khufu in gigagrams if it has the following dimensions?: Area of the base (1.94×10^5 square cubits) and height (165 m) (1 cubit = 0.4572 m)

$D = \frac{m}{V}$ $m = DV$

$V_{pyramid} = \frac{1}{3} L \times W \times H$

$$\frac{2.75\ ton}{m^3}\left(\frac{1.94\times10^5\ cubits^2}{3}\right)\left(\frac{0.4572m}{1\ cubit}\right)^2\left(\frac{165m}{1}\right)\left(\frac{2000\ lb}{1\ Ton}\right)\left(\frac{454g}{1lb}\right)\left(\frac{1Gg}{1\times10^9 g}\right) = \boxed{5570\ Gg}$$

The futures market on May 19, 2003 listed the opening price of unleaded gasoline at $0.5462 per gallon. What is the value of a storage tank filled with unleaded gasoline? The cylinder storage tank is 35 feet tall and 45 feet in diameter.

$V_{cylinder} = \pi r^2 l$

$\frac{d}{2} = r$

$$\frac{\pi}{1}\left(\frac{45\ ft}{2}\right)^2\left(\frac{35\ ft}{1}\right)\left(\frac{12 in}{1ft}\right)^3\left(\frac{2.54cm}{1in}\right)^3\left(\frac{1L}{1000cm^3}\right)\left(\frac{1.1qt}{1L}\right)\left(\frac{1gal}{4qt}\right)\left(\frac{\$0.5462}{1gal}\right) = \$236,762.1$$

Bromine is used to make flame retardant plastics and cloth and to make photographic film. The bromine used in making these and other products is obtained from concentrated brines. Seawater contains 0.0065 % bromine by mass, the density of seawater is found to be 1.025 g/mL. How many gallons of seawater will contain 600 pounds of bromine?

SW = Seawater

$$600\ lb_{Bromine}\left(\frac{454g}{1lb}\right)\left(\frac{100g\ SW}{0.0065g_{Bromine}}\right)\left(\frac{1mL}{1.025g}\right)\left(\frac{1L}{1000mL}\right)\left(\frac{1.1qt}{1L}\right)\left(\frac{1gal}{4qt}\right) = \boxed{1\times10^6\ gallons}$$

$D = \frac{m}{V}$ $V = \frac{m}{D}$